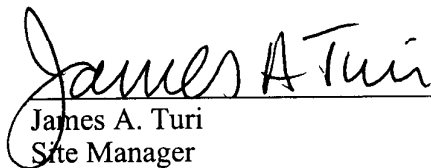
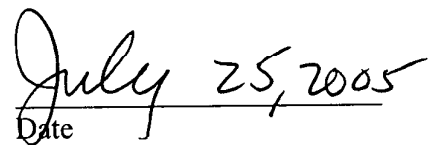


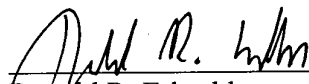
**THOMAS JEFFERSON  
NATIONAL ACCELERATOR FACILITY**

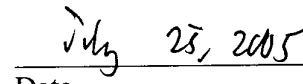
**SITE UTILIZATION  
AND  
MANAGEMENT PLAN**

**July 2005**

  
\_\_\_\_\_  
James A. Turi  
Site Manager  
Thomas Jefferson Site Office

  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Donald R. Erbschloe  
Acting Chief Operating Officer  
Office of Science

  
\_\_\_\_\_  
Date

## **TJNAF SITE UTILIZATION & MANAGEMENT PLAN**

### **July 2005**

This Site Utilization and Management Plan is written using the guidance provided in the Department of Energy Acquisition Letter No. 2000-08, "Site Utilization and Management Planning," dated August 18, 2000. This Plan is intended to supplement existing planning documents, and minimizes replicating these existing plans wherever possible. A more detailed understanding of the key programs and activities can be found in the *Jefferson Lab Institutional Plan FY 2004 - 2008*, and the *Thomas Jefferson National Accelerator Facility Ten Year Site Plan FY 2007 – FY 2016*, which are considered as supplemental to this document.

#### **1. Site Responsibilities Under the DOE Strategic Plan**

Thomas Jefferson National Accelerator Facility (TJNAF, Jefferson Lab, or JLab) is operated as an Office of Science (SC) program-dedicated lab with an annual budget of approximately \$100M. The site is comprised of 162.5 DOE owned acres located in Newport News, Virginia. JLab provides experimenters with worldwide unique capabilities for the study of hadronic physics. JLab maintains core competencies in nuclear physics and accelerator technologies to support not only its research program, but broader Office of Science missions (e.g., Spallation Neutron Source (SNS)) in the context of the national lab system and applies these technologies to activities in the national interest (e.g., Free Electron Laser (FEL)).

At the end of FY04 the site employed a total of 690 Southeastern University Research Association (SURA) (regular, part-time, casual, & student), 11 DOE, 11 State and 31 contract labor personnel. In a normal year Jefferson Lab also serves a physics research user population of over 2,000. These users are from the United States and numerous other nations. In FY04, there was an average of 340 users on site per month.

The mission of TJNAF is consistent with and implements the expectations contained within the 2003 DOE Strategic Plan "To protect our national and economic security by providing world class scientific research capacity and advancing scientific knowledge." This is a pivotal time for TJNAF and the future offers both rich opportunities and some challenges. The Continuous Electron Beam Accelerator Facility (CEBAF) has far exceeded the initial design goals allowing development, in close collaboration with the User community, of a research program that is even richer and more exciting than originally anticipated. Recent results such as the highly accurate determination of the nucleon form factors and the identification of what may be the first penta-quark state, have demonstrated the potential of the scientific program for unexpected insights and

discovery. TJNAF expertise in superconducting radio-frequency (SRF) technology has resulted in the successful support of the Spallation Neutron Source Project as well as the record-breaking Free Electron Laser (the first application of an energy-recovering linac), thus providing a solid return on investment in the form of advanced accelerator capabilities made available to the Office of Science, DOE, and the nation.

The key challenge is timely realization of the 12 GeV Upgrade at TJNAF to secure the long term future of hadronic physics. Second, TJNAF has been operating at less than optimal utilization due to funding constraints, rejecting many outstanding research proposals and presenting many of its Users with the obstacle of a four year backlog of approved experiments. Finally, adequate funding is required for TJNAF to maintain its core competency in SRF technology. All of these challenges result from the competition for resources in a time of extreme budget pressures both inside and outside of DOE.

## **2. Key DOE Program Offices and Description of Work for Each Program**

### **2.a. Project Business Line Activities, Including New and Developing Missions, and Changes to Existing Missions**

The key DOE Program Office is the Office of Science (SC). Within SC, the primary business line is the Nuclear Physics program. The broad thrust of the nuclear physics experimental program, using the 6 GeV CEBAF, is focused on addressing key scientific questions of paramount importance for understanding nuclear physics. These questions coincide with the broad directions of the field of nuclear physics as identified by the 2002 Long Range Plan for NSAC (the Nuclear Science Advisory Committee of the DOE and the National Science Foundation) and the decadal survey of the field by the National Research Council of the National Academy of Sciences.

The full realization of the scientific benefits of the Laboratory's mission to explore the quark and gluon structure of the nucleon requires extensive theoretical work. TJNAF maintains a strong nuclear theory group in partnership with Hampton University, Old Dominion University, and the College of William and Mary. The group includes expertise spanning a broad range from the nuclear many-body problem to strong Quantum Chromodynamics (QCD), as appropriate for a laboratory working at the interface between nuclear and particle physics. In addition to supporting the CEBAF experimental program directly, TJNAF theorists collaborate closely with other theorists around the world on CEBAF-related problems. Additionally, a major new theory initiative in support of the nuclear physics program is the development of advanced computational techniques to solve QCD numerically in the "strong" regime that is appropriate for understanding nucleon structure. TJNAF is key participant in the National Computational Infrastructure for Lattice Gauge Theory, the DOE SciDAC project that brings together theorists, computer scientists, and computational scientists to tackle demanding QCD calculations.

The TJNAF Free-Electron Laser (FEL) Program developed from the laboratories desire to exploit its unique core competency in SRF accelerator technology. In 1991, the laboratory formed an Industrial Advisory Board with scientists selected from major industrial research laboratories to explore the potential opportunities and requirements for SRF-driven FELs as unique tools for advanced manufacturing based on the laser processing of materials. In 1993, the group of stakeholders for the FEL Program was enlarged with the formation of the Laser Processing Consortium including participation from the Naval Post Graduate School. The FEL is now being commissioned in the range of 10 kW after an upgrade from 1 kW. The upgrade provides ten times more optical power for approximately twice the capital investment compared to the original 1 kW Demo FEL. It is expected that this type of FEL scaling is possible for 100 kW and beyond. Industrial stakeholders and the defense community have interests in pushing FEL technology beyond 10 kW.

The TJNAF core competency in SRF accelerators and 2 degree Kelvin cryogenic operations has also been used to support the SNS and Rare Isotope Accelerator (RIA) projects. For the SNS project, TJNAF was the lead partner for the cryogenic refrigeration system and the SRF Cryomodules. This work is complete and it is likely that the laboratory will continue to support the SNS on planned upgrades.

The Rare Isotope Accelerator (RIA) project is also expected to use similar SRF accelerator technology as SNS. TJNAF has been conducting R&D to optimize the SRF system for the RIA project and is expecting to contribute to execution of the RIA Project.

Since TJNAF has a unique core competency in SRF technology, efforts are underway to expand this capability in support of further SRF accelerator advances. These include development of fabrication procedures and processes to achieve higher accelerating gradients and development of more cost-efficient designs and fabrication procedures. Planning is also underway for construction of an SRF Engineering Test Facility in addition to continued use of CEBAF and the FEL as test beds for advanced SRF accelerator components. Funding for the SRF Engineering Test Facility is uncertain at this time.

The 12 GeV Upgrade Project is critical to secure the long term future of hadronic physics which is the main stay of TJNAF programs. The evolution of understanding strongly interacting matter during the almost two decades that have passed since the parameters of CEBAF were initially defined has revealed the importance of experimental questions best addressed by a 12 GeV CEBAF. The initial design of CEBAF makes it feasible to triple the original design energy of 4 GeV to 12 GeV for a modest fraction of the initial facility cost. The project is currently planned for completion by CY 2012.

Other activities that receive small amounts of funding but are significant to the mission of the laboratory include Laboratory Infrastructure, Biological and Environmental Research, Energy Efficiency, Education, and Light Source funding from the Commonwealth of Virginia. There is no support from other DOE program offices. Other Federal support is

limited to Department of Defense agencies sponsorship of the aforementioned FEL Program.

The following is a list of major activities and accomplishments expected over the next ten years:

FY 2006 – FY 2007

- Completion of 61,000 square foot addition to the CEBAF Center. This addition will provide greatly needed computer center and office space to support laboratory operations.
- Nuclear Physics experiments using 6 GeV capability on Nuclear Form Factors, Missing Baryon Resonances, Nucleon Spin Structure, Few-body Properties, and Many-body Nuclei
- Ongoing R&D in SRF and Accelerator Physics
- Initiation of 12 GeV Upgrade Project design
- Upgrade of computer equipment for theory and advanced computational science as part of SciDAC project
- Commissioning of the 10 KW FEL

FY 2008 – FY 2010

- Nuclear Physics experiments using 6 GeV capability continued on Nuclear Form Factors, Missing Baryon Resonances, Nucleon Spin Structure, Few-body Properties, and Many-body Nuclei
- Initiation of 12 GeV Upgrade Project Construction
- Theory support and application of computational capability for Lattice Quantum Chromodynamics (QCD) computations
- SRF support for RIA design
- Construction and commissioning of 100 KW FEL

FY 2011 – FY 2016

- Initiation of 12 GeV Operations
- Nuclear Physics experiments using 12 GeV capability on Quark Confinement, Valance Quark Distribution, Quark Correlations, Nuclear Medium Effects, and Charm Production
- SRF support for RIA construction
- FEL 100 KW user application and support for R&D on higher power FELs

## **2.b. Interrelationship among business line activities, relative significance of business lines, and reconciliation of competing mission objectives**

As indicated earlier, TJNAF is an SC program-dedicated lab. Funding is primarily provided by the Office of Nuclear Physics and its programmatic requirements take first priority. The FEL Program is the next priority based on funding and the extent of the client base. These two program areas are the major focus of TJNAF and take priority

over other programs should conflicts arise. As with other laboratories, there is a great deal of leveraging across program areas. Research and technology development in one area frequently benefits another program. A good example is the use of CEBAF and the FEL as test beds for advanced SRF components which in turn benefits both of those programs while advancing this unique capability for all of DOE and the international science community.

Another significant source of funding for TJNAF is the Science Laboratory Infrastructure Program. Since this program is structured to facilitate maintenance and development of the SC laboratories infrastructure, these activities inherently support the other program activities at the laboratory.

## **2.c Internal or External Events That May Effect Site Operations**

The 12 GeV Upgrade Project will require shut down of CEBAF during the time when modifications are being made to the accelerator. The anticipated duration of the shut down is approximately one year in the FY 2010 – FY 2011 timeframe. No physics research activities would be performed in CEBAF facilities during this timeframe. However, the nuclear physics research community is highly supportive of this project and there are no significant concerns regarding the shutdown.

There is a potential for external events to positively effect site operations. The Commonwealth of Virginia and City of Newport News are highly supportive of TJNAF. To this end, Newport News has long range plans to develop a technical park adjacent to the TJNAF site. Newport News considers TJNAF the corner stone of these plans and when plans for the technical park start to materialize there will likely be synergistic development for all involved. There are no known potential regulatory, community, or other parties which could have a negative impact on site operations.

## **2.d. Local Area Considerations**

The DOE owned TJNAF is located in Newport News, Virginia, covering 162.5 acres. Historically there have been several former users of this general area. 110 acres were the site of the former Space Radiation Effects Laboratory (SREL) operated by the National Aeronautics and Space Administration (NASA) where there was a 600 million electron volt synchrocyclotron from 1964 to 1984. The SREL, associated parking, cooling towers, and small building annex comprised 10 acres of the total former site with the remaining 100 acres being heavily wooded and undeveloped. The existing building and land were transferred from NASA to DOE in 1987 with a reimbursement to the General Services Administration (GSA) in the amount of \$2.3 million that was funded by the City of Newport News, Virginia. The SREL building is now used as the Test Lab for TJNAF.

Adjacent to the NASA property to the east is an 83.65 acre parcel previously owned by U.S. Department of Defense and subsequently by the U.S. Department of Education for which the City of Newport News reimbursed GSA \$1.498 million in 1982. The City of Newport News gifted 44.6 acres of this property to SURA in support of the contract

between SURA and DOE. SURA sold the acreage to DOE for \$1 in January 1987. The City of Newport News then gifted another 51.5 acres to SURA in 1988. In 1993, 7.9 of these acres were transferred to DOE by SURA, a portion of which was a US Air Force BOMARC Missile Site that existed during the 1950's and was abandoned in the early 1960's.

SURA retained the remaining 43.6 acres, adjacent to the Jefferson Lab site, for a 42-room Residence Facility owned and operated by SURA and for future Lab-related activities. The SURA Residence Facility is available for use by guests, visitors, users, and graduate students associated with the Lab.

North of the DOE site is an 8 acre parcel referred to as the Virginia Associated Research Campus (VARC) which is owned by the Commonwealth of Virginia and leased to SURA for use in support of TJNAF. A total of 4.8 of these acres containing the VARC and Forestry buildings are subleased to DOE. Both the SURA and VARC property are included in overall site planning.

Funding from the Commonwealth of Virginia was provided for the construction of the 31,176 SF Free Electron Laser (FEL) Facility on TJNAF, which was completed in 1997 and transferred to DOE.

### **3. Current and planned budget to accomplish each of the objectives of each program, including the contingency plan for dealing with the effects of reduced appropriations.**

A summary of the current TJNAF contract budget and the budget projections through FY 2011 is depicted below (\$M):

<b>FUNDING M\$: (FY06 - FY11 Requirements)</b>	<b>FY04 Actual</b>	<b>FY05 Actual</b>	<b><u>FY06</u></b>	<b><u>FY07</u></b>	<b><u>FY08</u></b>	<b><u>FY09</u></b>	<b><u>FY10</u></b>	<b><u>FY11</u></b>
<b>Nuclear Physics Funding:</b>								
ME Research	5.2	5.2	5.1	5.3	5.5	5.6	5.8	6.0
Theory Research	2.4	1.7	1.6	1.7	1.7	1.8	1.8	1.9
RIA R&D	0.1							
Facility Operations	<u>73.4</u>	<u>78.2</u>	<u>71.6</u>	<u>72.2</u>	<u>73.4</u>	<u>75.3</u>	<u>77.6</u>	<u>80.1</u>
Operations Subtotal	81.2	85.1	78.2	79.2	80.6	82.7	85.3	88.0
GPP	2.1	0.8	0.7	0.8	0.8	0.8	0.8	0.8
12 GeV PED/Construction				3.0	4.0	4.5	4.5	4.5
<b>Other Research</b>								
CEBAF Center Addition	9.0							8.5
SRF Engineering Test Facility					10	10		
Test Lab Rehab								
Spallation Neutron Source	4.0							
Safeguards and Security	1.1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Imaging	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
SciDAC		0.7	0.7	0.7	0.7	0.7	0.7	0.7

LQCD Facilities			0.4	1.0	1.0	1.1	1.1	1.1
FEL	16.5	10.9	12.5	12.0	12.0	12.0	12.0	12.0
Other	0.2	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Commonwealth of Virginia	1.2	1.2	1.6	1.6	1.6	1.6	1.6	1.6
<b>Total</b>	<b>116.3</b>	<b>102.2</b>	<b>97.6</b>	<b>101.6</b>	<b>111.6</b>	<b>114.1</b>	<b>106.6</b>	<b>117.8</b>
Weeks Of Operation	30.0	29.8	28.4	29.4	29.4	29.4	29.4	29.4
Reliability	85%	80%	85%	85%	85%	85%	85%	85%
Manpower (FTE, Staff, Students, Joint Appointments, Contract Labor, State)	714	705	653	667	667	667	667	667
Number of Users/yr	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150
Number of On-site Users Per Year	746							
Average Users on-site per month	342							
Max Users on-site During a given Month	437							
Month Max Users on-site During a given Month	June							
Max Users On-site During a given day	292							

Actual budget numbers for FY04 and FY05 are shown in this table with requirements depicted for FY06 – FY11. The requirements numbers shown assume essentially level operations with design activities only for the 12 GeV Upgrade Project.

Contingency approaches to deal with the effects of reduced appropriations include reduction of running time for the accelerator and improvements in efficiency of operations such as implementation of procedures to reduce costs of energy usage. The cost of energy is a significant portion of the total cost of operating TJNAF. In the case of extreme reductions in appropriations, shut down of operations at TJNAF has been evaluated.

#### **4. Management approach to be employed to control changes to the planned work and the assignment of unexpected work.**

The TJNAF Site Office (TJSO) plans, executes, and controls work scope consistent with the principles of DOE Order 413.3, Program and Project Management for the Acquisition of Capital Assets, and with DOE contracting requirements. The following sections summarize key elements of the TJSO management system.

##### **4.a. Contract Management**

The DOE Administrative Contracting Officer (ACO) is the focal point for all contract actions. While DOE Project Directors may initiate contract actions, only the ACO or Contracting Officer (CO) can modify the prime contract terms, cost, schedule, or fee. Any change that affects a contract must be processed through the ACO or CO. The ACO or CO is also the addressee or is copied (in the case of technical issues) on all correspondence concerning performance of the contract. All such correspondence is tracked, retrieved, and stored in accordance with contract requirements. Correspondence



to contractors is carefully screened by the ACO or CO and any potential change is routed through the TJSO.

Changes to the contract may be necessary as a result of additional work being required due to changes in external factors, changes in mission/scope by DOE, or unanticipated field conditions identified by the contractor. Changes to the TJNAF contract are processed through the TJSO. Unanticipated field conditions are addressed in accordance with contractor and DOE procedures and are addressed on a graded basis. The ACO or CO is the approval authority.

The ACO and CO can issue unilateral modifications to increase the obligation of funds. Input from DOE Subject Matter Experts and the contractor will be obtained prior to modification of the contract on the basis of directives and orders. The contractor signs bilateral modifications to change contract provisions.

#### **4.b. Monitoring and Performance Evaluation Measurement**

A Performance Evaluation Management Plan (PEMP) will identify end-states, drive customer-negotiated performance expectations and incentivize work activities. The PEMP will include all agreed Performance-Based Indicators (PBIs) between DOE and the contractor. The PEMP will be developed in accordance with the Office of Science Laboratory Appraisal Process.

PEMP reporting and performance management is comprised of those activities that facilitate the documentation of evidence that work activities are progressing as planned. Annual Peer Review in addition to Operational Awareness are key elements of the performance management process. Operational Awareness is maintained by continuous TJSO monitoring of contractor activities and performance of work.

PEMP closeout and performance assessment are a critical part of the performance management strategy. Each performance measure or expectation contained within a PBI is closed on completion of work activities. The closeout process for performance measures and expectations provides a formal means where by agreement between DOE and the contractor regarding level of performance achieved can be documented, agreed and signed-off as complete. The determined level of performance achieved will be used to calculate the amount of fee paid for performance.

### **5. Discussion of infrastructure at the site to support each program predicated upon full integration of site program planning, management, and assessment.**

TJNAF consists of 62 owned buildings, 2 State leased buildings, 23 real property trailers, and 10 other structures and facilities totaling 686,972 square feet (SF). Included are 49,346 square feet of real property trailers with an average age of 14 years that provide offices to approximately 150 employees and 250 users. The replacement value of conventional facilities and utilities is \$206 million.

Adjacent to the northwest of TJNAF, SURA leases 44,342 SF for TJNAF of office and lab space at a favorable rate in the Applied Research Center (ARC) from the City of Newport News. In addition to these facilities, TJNAF has 70 personal property trailers (21,744 SF) used for storage scattered around the site and 11,558 SF off-site leased storage space.

The Facilities Management Department manages a facilities condition assessment program that utilizes a multidisciplinary team including an architect, engineers, EH&S personnel, and building occupants to evaluate the functional condition and maintenance needs of each facility. These evaluations are performed on a three-year cycle. Results of the assessment are prioritized and either handled as a corrective work request or programmed for future funding. A combination of consultant and in-house personnel perform the assessments. Overall condition of the facilities is good with the exception of trailers which have passed their useful life and scheduled for replacement.

Shortfalls of current facilities to meet current mission needs have been identified. Facilities and Infrastructure issues are primarily driven by the large number of personnel housed in “temporary” trailers and the fact that the Lab has not had adequate technical support and user space from its inception. Correcting this shortfall has been materially hampered by the limited funds overall for scientific and infrastructure priorities. CEBAF Center Addition Phase 1, a Science Laboratory Infrastructure (SLI) project currently under construction, will greatly assist in providing needed computational and office space when completed in FY06.

## **6. Current contractual configuration and future plans for achieving Departmental responsibilities, including any planned privatization of site functions.**

The nature of the TJNAF mission is such that it cannot be met by existing DOE in-house personnel or by traditional FAR-based contractor procedures. The Jefferson Lab missions require a long-term relationship that will provide continuity and will allow the Laboratory to attract the best scientific and management personnel. Only a Federally Funded Research and Development Center (FFRDC) can provide the long-term relationship that is necessary to the Department missions. The performance based management and operating (M&O) contract (or “sponsoring agreement”) includes all the criteria outlined under FAR 35.017-1. that are required for an FFRDC.

Use of a performance-based management (PBM) program at TJNAF began in 1995 and is expected to continue with award of the new contract in FY 2006. The PBM program rewards overall management of the contractor's science and technology performance, as well as effective and efficient implementation of critical operational and administrative management systems. The fundamental approach is to monitor and drive continued improvement in performance results for these areas by focusing on performance outcome trends over time.

The PBM program is structured to complement the Department's Strategic Plan, the Secretary's Agreement with the President, and objectives of the Government Performance and Results Act (GPRA); and to manage and administer the contract through a process that establishes clear performance expectations across the full range of operations and administration (O&A) functions as well as in the science and technology (S&T) mission. The annual appraisal process measures against these expectations and rewards or penalizes the contractor for its overall performance based on the results of the annual validation, evaluation, and rating.

The Thomas Jefferson Site Office (TJSO) is responsible for the administration of all aspects of the TJNAF M&O contract, including oversight of the contractor's subcontract process, personnel policies, and industrial relations. The Office of Nuclear Physics (within the Office of Science) in DOE-HQ is solicited annually for input on the laboratory's S&T performance.

The new contract to be awarded in FY 2006 is expected to include a five year base term with an initial award term not-to-exceed three years and additional single year award terms not-to-exceed a total contract term of twenty years. The acquisition will be a best-value negotiated procurement following the requirements in FAR part 15. With the understanding that research activities are assigned through strategic planning, program coordination, and cooperation with DOE; the successful Offeror will be expected to provide the intellectual leadership and management expertise necessary to manage, operate, and staff TJNAF.

There are no plans to "privatize" any of the site functions. Currently site infrastructure support is largely procured through competitive fixed priced sub-contracts or is provided by the City of Newport News.